Non-Linear Image Registration on Octrees.

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Abstract

Image registration is one of todays challenging image processing problems. Given a so-called reference image and a so-called template image, the task is to find a reasonable deformation field such that a transformed version of the template becomes similar to the reference. Image registration has to be applied whenever images resulting from different times, devices, and/or perspectives need to be compared or integrated.

Already for reasonable sized 3D images, image registration becomes a computationally intensive task. Here, we introduce and explore the concept of multi-level adaptive refinement techniques based octrees in order to recover a non-linear deformation field. We demonstrate the performance of the new approach by academic (2D) as well as real life (3D) examples. These examples indicate that the computational time can be drastically reduced compared to standard approaches.